

REMARKS

Claims 1, 5, 6, 8-10, 12, 14, 15, 18 and 20-24 are pending in the application.

Claims 20, 22, 23 and 24 (properly noted by the Examiner as dependent from claim 22) are rejected as being substantial duplicates of claims 14, 6, 15 and 8. Applicant agrees and cancels claims 20, 22, 23 and 24.

New claims 25 and 26 are added, which are respectively dependent from independent claims 1 and 6. These claims recite that the substrate is formed at least in part of metal.

Independent claims 1, 6, 18 and 21 have been amended to make it clear that all of the components are mounted on the substrate.

Claims 1, 5, 9 and 12 are rejected over the combination of Slutter, et al., U.S. 5,192,981 in evidence of Grossman, U.S. 3,865,490, in view of Tondello, et al., U.S. 4,254,335 and Machler, U.S. 4,709,989. These claims are directed to the monochromator having two concave mirrors mounted on a (the same) substrate in which the coefficient of linear expansion of the focal length of both of the concave mirrors and the coefficient of linear expansion of the substrate material are approximately the same. Claim 1 is the main claim and each of claims 5, 9 and 12 depends from it.

Slutter generally teaches a Czerny-Turner (hereinafter "CT") monochromator having two mirrors 40 and 80 and an aluminum base 28. Mirror 40 is a toroidal mirror. Mirror 80 is a spherical focusing mirror (column 4, lines 51-63). The Examiner states (Office Action, page 2, last two lines) that Slutter's spherical focusing mirror implies a concave structure. While in the broad sense this might be correct, more importantly, as set forth in the last lines of the Slutter Abstract, the fact is that the Slutter invention is in the use of a single toroidal collimating mirror in combination with a spherical focusing mirror. Thus, as seen, Slutter requires two different types of mirrors, as contrasted to the subject invention as set forth in claim 1 wherein two concave mirrors are used. This is a simpler configuration.

It is also important to note that Slutter makes no mention or suggestion of even considering, yet alone providing a solution for problems produced by thermal changes in a monochromator.

Grossman teaches a double monochromator structure using two CT monochromators. The monochromator has concave collimating mirrors 34 and 38. The double monochromator of this patent has a rather complex mounting structure (see Figs. 2-5) which is totally different from the structure of the invention in which the two concave mirrors and the diffraction grating are all mounted on the same substrate. Like Slutter, there does not appear to be any recognition in Grossman of the monochromator accuracy problem caused by changing thermal conditions.

Tondello is relied on for its teaching of a spectrograph monochromator in which all of the components are mounted on the same substrate. While this is true, the type of monochromator taught by this patent is of different structure than that of the CT type recited in claim 1. Therefore, it would not encounter the same thermal response problems and would not react in the same way to thermal changes as the structure of a CT type monochromator as set forth in claim 1. Further, Tondello does not at all recognize, yet alone seek to provide a solution for, the problem caused by thermal changes.

The Examiner combines the above three references to obtain the structure as set forth in independent claim 1. As noted, none of the three references recognizes the loss of accuracy problem in a monochromator caused by thermal changes, yet alone offers a solution. The Examiner next relies on the patent to Machler to supply the structure to solve the thermal problem. Machler broadly teaches a box 11 that holds a glass lens. Machler provides a thermally stable structure by making the box of compacted ceramic, which has the same coefficient of expansion as glass. Machler's ceramic box is not really a substrate in the meaning of the substrate of claim 1 of this application on which two concave mirrors and a diffraction grating are mounted. Further, there is no suggestion or teaching of how Machler's box could be configured to accommodate a CT type monochromator. Also, the use of Machler by the Examiner is by hindsight only, that is, a reference

with no connection to the invention is applied on the basis of the teachings of applicant's own invention.

Accordingly, the combination of references is not properly made and the combination, even if properly made, does not meet the subject matter set forth in main claim 1. Thus, claim 1 and its dependent claims 5, 9 and 12 are patentable and should be allowed.

Claims 14, 18 and 20 are rejected over Slutter and Grossman in view of Tondello and Machler, and further in view of Ito, U.S. 4,559,277. Claim 20 has been cancelled. Claim 14 depends from claim 12 and further adds to the glass mirror of claim 12, the substrate being of Al and ceramic. Claim 18 is an independent claim that recites the features of claim 1 and clearly sets forth the substrate as being of Al and ceramic components.

For the reasons given above with respect to claim 1, the combination of the Slutter, Grossman, Tondello and Machler references does not teach or suggest the novel subject matter of claim 1. This also applies to independent claim 18.

Ito is relied on for its teaching of an Al ceramic composite. Ito does not teach or suggest use of such a composite in a substrate for a monochromator with all of the monochromator components mounted on the substrate. The addition of Ito to the basic combination of references does not meet the subject matter of independent claims 1 and 18. Further, the addition of Ito is purely one of hindsight since none of the basic references teach the need for a monochromator made of the Ito composite. Therefore, claims 14 and 18 are patentable and should be allowed.

Claims 6, 10, 15, 22 and 23 are rejected as being unpatentable over Mori, et al., U.S. 6,166,805 in view of Slutter and Tondello and further in view of Machler. Claims 22-23 have been cancelled. Claim 6 is an independent claim from which each of claims 10 and 15 depends.

The Examiner recognizes that the principal reference to Mori does not teach a substrate. The Examiner apparently fails to recognize that since there is no substrate that there can be no occurrence and therefore no recognition of the thermal change problem addressed by the present invention.

As to Slutter, Tondello and Machler, the shortcomings of each of these references relative to the invention is discussed above. The combination of these references, even if it could be properly made, still does not teach the claimed structure and recognize the loss of accuracy problem present in such a structure due to thermal effect. The combination of references also does not teach the solution of the feature of independent claim 6 of the substrate and mirror having substantially the same coefficient of expansion. Therefore, claims 6 and dependent claims 10 and 15 also should be allowable.

Claims 8, 21 and 24 stand rejected over Mori in view of Slutter and Tondello and further in view of Machler, and further in view of Ito. Claim 24 has been cancelled. Claim 21 is an independent claim that parallels claim 6, discussed above, and calls for the substrate to be of Al and ceramic.

The deficiency of the basic combination of Mori, Slutter, Tondello and Machler in meeting the basic structure of claim 6 is discussed above. This also applies to claim 18. Ito is cited for the teaching of the Al-ceramic composite. But again, Ito does not teach or suggest use of such a composite in a substrate for a monochromator. Ito's addition to the basic combination of references does not meet the basic subject matter of claims 1 and 18. Further, the addition of Ito is purely one of hindsight since none of the basic references teach the need for use of a monochromatic substrate having the characteristics of the composite.

Accordingly, claims 8 and 21 should be allowable.

New claims 26 and 27, respectively depend from claims 1 and 6, and recite that the substrate is formed at least in part of metal and has approximately the same coefficient of linear expansion as that of the concave mirrors (claim 1) or mirror (claim 6). As explained in the Specification, the use of metal for the substrate permits the overall monochromator structure to be of relatively light weight. An Al-ceramic substrate would be lighter than if it was totally of ceramic, such as in Machler. In view of the allowability of the parent claims 1 and 6, claims 26 and 27 also should be allowable.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Prompt and favorable action is requested.

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Respectfully submitted,

By 

S. Peter Ludwig

Registration No.: 25,351

DARBY & DARBY P.C.

P.O. Box 5257

New York, New York 10150-5257

(212) 527-7700

(212) 753-6237 (Fax)

Attorneys/Agents For Applicant